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10/810,232	03/26/2004	Ryan Rifkin	23085-07809	9459

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EXAMINER	
RIDER, JUSTIN W	

ART UNIT	PAPER NUMBER
2626	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/810,232	RIFKIN, RYAN	
	Examiner	Art Unit	
	Justin W. Rider	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/ are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Amendment

1. In response to the Office Action mailed 05 September 2007, applicant submitted a response filed 05 December 2007; in which the applicant amended claims 1, 3-5, 15, 17, 31 and 33-35 without adding new matter. Claims 2, 16, 18 and 32 have been cancelled.

Response to Arguments

2. Applicant's arguments filed 05 December 2007 have been fully considered but they are not persuasive. The section entitled 'Inter-Message Matching' (**Bahler**, col. 8, line 15 - col. 9, line 50) discusses wherein data points are approximated by use of classes (Reference Classes) utilizing local areas for use in determining the appropriate classes or subsets of data points (col. 9, lines 62-63, *'Only the frames selected as described above are considered.'*). However, the arguments are associated with amended subject matter and addressed with respect to the limitations below.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1,3-5, 8-9, 11-13, 15, 17, 19-21, 24-25, 27-29, 31, 33-35, 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chen et al. (US Patent No. 6,539,351)** referred to as **Chen** hereinafter, in view of **Pellom et al. ("an efficient scoring algorithm for Gaussian**

mixture model based speaker identification", IEEE signal processing letters, vo1.5, 1998, pages 28 1-284) referred to as **Pellom** hereinafter.

Claim 1: **Chen** discloses a method of voice enrollment and recognition, comprising:

i. organizing a plurality of speaker data points, representing a plurality of enrollment speakers, into a data structure using high dimensional vectors that represent characteristics of enrollment voice samples from the enrollment speakers (col. 2, lines 40-62, 'generating (organizing) a high dimensional probability density model (read on data structure)', 'transforming acoustic data (characteristics of enrollment voice samples --speaker data) obtained from at least one speaker (enrollment speaker) into high dimensional feature vectors (can also be interpreted as speaker data points);

ii. estimating a probability density of a subset of the plurality of speaker data points comprising the [approximate] nearest neighbors to an unidentified voice sample from an unidentified speaker (col. 1, lines 32-32 and 63-67, 'nearest neighbor methods', 'parametric probability density models' for 'probability density estimation', 'Gaussian mixture probability density models.. .with a relatively small number of parameters (corresponding to subset of the plurality of speaker data points)', wherein the estimation necessarily includes using unidentified voice sample from an unidentified speaker, so that it would have been obvious to one of ordinary skill in the art at time the invention was made to combine nearest neighbor methods and parametric probability density models, such as Gaussian mixture probability density model, for a high dimensional probability density estimation using relatively small number of parameters, as taught by **Chen** himself, for the purpose of offering 'decent performance with a relative small number of parameters' for the estimation); and

iii. identifying the unidentified speaker based on one or more speaker data points most closely matching the unidentified voice sample as indicated by the estimated probability density (col. 2, lines 40-62, 'provides... expectation maximization (most closely matching) method which estimates the parameters of the mixtures of the probability density model' for 'speaker reorganization (necessarily includes unidentified speaker and it voice sample).

Chen fails to explicitly disclose "approximate" nearest neighbors. However, the feature is well known in the art as evidenced by **Pellom** who discloses 'an efficient scoring algorithm for Gaussian mixture model based speaker identification (title), comprising 'approximated nearest-neighbor Gaussian mixture probability density evaluation' and 'nearest-neighbor approximation with beam-search' (page 283, left col., last paragraph).

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify **Chen** by providing an approximated nearest-neighbor and/or nearest-neighbor approximation for speaker identification as taught by **Pellom**, for the purpose of reducing the computational complexity of identifying a speaker (**Pellom**: abstract).

Chen, in view of **Pellom** discloses a method as per claim 1 above, estimating a probability density function (**Chen**: col. 7, line 59). Nevertheless, **Chen** in view of **Pellom** does not expressly disclose "using Patten windows to estimate the probability density function".

However, the feature is well known in the art as evidenced by **Bahler** who discloses automated sorting of voice messages through speaker sporting (title) for speaker recognition (abstract), comprising using Parzen estimate of local probability density and nearest neighbor distance (col. 8, lines 16-25) without including all speaker data points (**Bahler**, col. 8, line 15 - col. 9, line 50) discusses wherein data points are approximated by use of classes (Reference

Classes) utilizing local areas for use in determining the appropriate classes or subsets of data points (col. 9, lines 62-63, *'Only the frames selected as described above are considered.'*).

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify **Chen** in view of **Pellom** by providing Parzen estimate for speaker identification, as taught by **Bahler**, for the purpose of improving speaker recognition system (**Bahler**: col. 5, lines 11-12).

Claim 3: **Chen,** in view of **Pellom** discloses a method as per claim 1 above, wherein the step of estimating further comprises estimating the probability density based on a distance between individual speaker data points within the subset of speaker data points, (**Chen**: col. 13, lines 65-67, 'distance between their probability density functions'; col. 16, lines 27-29, 'minimizes the negentropy distance'; **Pellom**: page 282, right col., paragraph 2, 'form a subset of observations (speaker data points)').

Claim 4: **Chen,** in view of **Pellom** discloses a method as per claim 1 above, further comprising controlling the relative contributions of individual speaker data points within the subset of speaker data points to the probability density based on a distance to a speaker data point from the unidentified voice sample, (**Pellom**: page 282, right col., paragraph 2, 'form a subset of observations (speaker data points) by sampling the observations nearest to the midpoint of previously scored element (interpreted as controlling the relative contributions)', 'pick highest probable speaker').

Claim 5: **Chen,** in view of **Pellom** discloses a method as per claim 1 above, further comprising estimating the probability density of the subset of speaker data points independent of parametric distribution information related to the plurality of speaker data points", (**Chen**: col. 2,

lines 57-60, 'each compound Gaussian models each of the coordinated as each of the components of the probability density model in dependently'; **Pellom**: page 28 1, right mi., paragraph 1, 'in (3), the observations are assumed to be statistically independent').

Claim 8: **Chen,** in view of **Pellom** discloses a method as per claim 1 above, wherein the plurality of speaker data points comprises a relatively large number of speaker data points, (**Pellom**: page 283, left col., paragraph 1, '6 min of speech found in the enrollment section of database... ten tests per speaker each of approximately 15 s in duration... 10 ms from 20 ms overlapping window, 19 mel-frequency cepstral coefficients ... 64 Gaussian mixture...').

Claim 9: **Chen,** in view of **Pellom** discloses a method as per claim 1 above, further comprising retrieving the subset of speaker data points using an unidentified speaker data point from the unidentified voice sample as an index into the plurality of speaker data points", (**Pellom**: page 283, left col., paragraph 2, 'form a subset of observations (speaker data points) by sampling the observations nearest to the midpoint of previously scored element.. . spaced interval across the vectors', wherein i is index).

Claim 11: **Chen,** in view of **Pellom** discloses a method as per claim 1 above, further comprising more than one speaker data point associated with a common identification, and the step of identifying the unidentified speaker accumulates a score for the common identification", (**Pellom**: page 283, left col., paragraph 2, 'page 283, left col., paragraph 1, 'ten tests per speaker each of approximately 15 s in duration').

Claim 12: **Chen,** in view of **Pellom** discloses a method as per claim 1 above, further comprising identifying the unidentified speaker as one of the enrollment speakers if matching is within an error threshold", (**Chen** : col. 29, lines 2 1-45, 'extracting a lower dimensional feature

from the original feature', 'estimated from the training data'; **Pellom**: page 282, right col., paragraph 1, steps 1)-5)).

Claim 13: **Chen,** in view of **Pellom** discloses a method as per claim 1 above, further comprising extracting the high-dimensional vectors from the enrollment voice samples and the unidentified voice sample", (**Chen** : col. 29, lines 50-58, 'speaker recognition'; **Pellom**: page 282, right col., paragraph 1, 'set a pruning threshold'(corresponding error threshold, 'pick (identifying) highest probable speaker').

Claim 15: Claim 15 is similar in scope and content to that of Claim 1 above and so is therefore rejected under the same rationale.

Claims 17, 19-21,24-25 and 27-29: Claims 17, 19-21, 24-25 and 27-29 are similar in scope and content to that of Claims 1, 3-5, 8-9 and 11-13 and so therefore are rejected under the same rationale.

Claims 31, 33, 35, 38-39 and 41-43: Claims 31, 33, 35, 38-39 and 41-43 are similar in scope and content to that of Claims 1, 3-5, 8-9 and 11-13 and so therefore are rejected under the same rationale.

5. Claims 6, 22 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chen**, in view of **Pollom** as applied to claim 1 above, and further in view of **Bahler (US Patent No. 5,271,088)** referred to as **Bahler** hereinafter.

Claim 6: **Chen,** in view of **Pellom** discloses a method as per claim 1 above, wherein a distance between individual speaker data points is based on characteristic similarities between

associated voice samples, the distance measured in terms of one from the group containing: a Euclidean distance, a Minkowski distance, and a Manhattan distance.

However, the feature is well known in the art as evidenced by **Bahler** who further discloses 'the minimum Euclidean squared distance between the unknown speech frame and all reference frames of a given speaker over all frames of the unknown input (abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify **Chen** in view of **Pellom** by providing Euclidean squared distance, as taught by **Bahler**, for the purpose of improving speaker recognition (**Bahler**: abstract).

Claims 22 and 36: Claims 22 and 36 are similar in scope and content to that of Claim 6 above and so therefore is rejected under the same rationale.

6. Claims 7, 10, 23, 26, 37 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chen**, in view of **Pollom** as applied to claims 1, 15 and 30 above, and further in view of **Arya et al., "an optional algorithm for approximated nearest neighbor searching in fixed dimensions", Journal of the ACM, Vol. 45, No.6, November 1998, pp.89 1-923)** referred to as **Arya** hereinafter.

Claim 7: **Chen**, in view of **Pollom** does not expressly disclose, "the data structure comprises a kd-tree". However, the feature is well known in the art as evidenced by **Arya** who discloses 'an optional algorithm for approximated nearest neighbor searching in fixed dimensions' (title), comprising data structure 'implemented an optimized kd-tree' Page 914, paragraph 2).

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify **Chen** in view of **Pellom** by providing data structure using kd-tree,

as taught by **Arya**, for the purpose of comparison of different approach for approximate nearest neighbor queries (**Arya**: page 9 14, paragraph 2).

Claim 10: **Chen**, in view of **Pollom** does not expressly disclose "retrieving approximate nearest neighbors to the unidentified speaker data point, the approximate nearest neighbors comprising speaker data points within a distance calculated as a function of a distance of an absolute nearest neighbor". However, the feature is well known in the art as evidenced by **Arya** who further discloses 'approximate nearest neighbor of q if its distance from q is within a factor of $(1+\varepsilon)$ of the distance to the true nearest neighbor (interpreted as absolute nearest neighbor)' (abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify **Chen** in view of **Pellom** by providing approximate nearest neighbor within a distance to the true nearest neighbor (absolute nearest neighbor), for the purpose of reducing computation time and/or complexity for data searching (**Arya**: abstract).

Claims 23 and 37: Claims 23 and 37 are similar in scope and content to that of Claim 7 above and so therefore is rejected under the same rationale.

Claims 26 and 40: Claims 26 and 40 are similar in scope and content to that of Claim 10 above and so therefore is rejected under the same rationale.

7. Claims 14, 30 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chen**, in view of **Pollom** as applied to claims 1, 15 and 30 above, and further in view of **Bahler et al. (US Patent No. 5,414,755)**, hereinafter referenced as **Bahler '755**.

Claim 14: **Chen,** in view of **Pellom** does not expressly disclose, "an enrollment voice sample and the unidentified voice sample of a common speaker are text-independent".

However, the feature is well known in the art as evidenced by **Bahler '755** who discloses 'system and method for passive voice verification in a telephone network' (title), comprising 'a text-independent approach' to 'speaker recognition' (col. 4, lines 28-36).

Therefore, it would have been obvious to one of ordinary skill in the art at time the invention was made to modify **Chen** in view of **Pellom** by providing text-independent approach to speaker recognition, as taught by **Bahler '755**, for the purpose of improving speaker recognition system (**Bahler '755**: col. 5, lines 11-12).

Claims 30 and 44: Claims 30 and 44 are similar in scope and content to that of Claim 14 above and so therefore are rejected under the same rationale.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin W. Rider whose telephone number is (571) 270-1068. The examiner can normally be reached on Monday - Friday 7:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Hudspeth can be reached on (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

J.W.R.
07 February 2008

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